



# 2023 MATE ROV COMPETITION TECHNICAL DOCUMENTATION SCORING REQUIREMENTS - EXPLORER, PIONEER, RANGER

## Overall Report

Max Points: 44 Weight: 15%

### Document Specifications

Document met the following requirements: (1) length no more than 25 pages, inclusive of SID, safety checklist, and all appendices, (2) font size of at least 12 points, (3) table of contents included, and (4) all measurements are in SI units (except things traditionally specified in other units, e.g., PVC diameter)

This scale applies only to first two questions. See Rubric for the remainder of the questions.

**Note:** Linked or attached documents will not be judged as part of the technical report score.

All 4 requirements met = 4 points

Title page met the following content requirements: (1) company name, (2) organization/school name and location (city, state, country), (3) team members and their roles, (4) and mentor name(s)

3 requirements met = 3 points

2 requirements met = 2 points

1 requirement met = 1 point

Abstract provided clear, concise summary of work in 250 words or less

### Use of Images and Data

Photo(s) of vehicle was included

Effective use of images, diagrams, and data to communicate the design and thought process

Photos accompanied by appropriate captions

Diagrams and drawings used sensible labeling of signals, dimensions and components

### Document Design

Thorough attention to grammar and spelling

Document was thoughtfully prepared, with thorough attention paid to messaging strategy and aesthetic presentation

### Acknowledgements and References

Document provided a properly documented list of references - books, journals, web sites, etc. used as sources; documented contributions of companies, individuals who contributed funds, equipment, and/or technical/moral support

Document provided adequate acknowledgement of contributions of companies and individuals who contributed funds, equipment, and/or other support to the team

## Teamwork

Max Points: 12 Weight: 10%

### Project Management

Included a description of the company (overview or company profile) and personnel (individual members and their roles and responsibilities)

Developed a schedule to aid in building the vehicle

Described how resources, procedures, and protocols were managed to meet mission objectives and solve day-to-day operational problems

## Design Rationale

*This section should include a detailed description of the vehicle, tools, and other subsystems*

Max Points: 92 Weight: 40%

### Engineering Design Rationale

Overall vehicle design presented in clear and logical manner

Demonstrated step-by-step planning and design process

Design decisions discussed and demonstrated thoughtful and balanced trade-offs

### Innovation

Company made innovations or modifications resulting in higher functionality at reduced costs

Innovation demonstrated in vehicle design, tools, or other features

### Problem Solving

Described how the company brainstormed ideas

Used rational process (data, trade study) to evaluate alternatives

### Systems Approach

Company demonstrated a balanced systems approach to the design (e.g., good integration between vehicle and sensors, holistic approach to vehicle systems, etc.)

### Vehicle Structure

Described trade-offs and rationale for vehicle cost, size, and weight

### Vehicle Systems

Described logically and clearly how components and materials were selected to perform specific tasks in a cost-effective way

Described how the design evolved to meet the mission specifications

### Control/Electrical System

Described the vehicle's electronic design and cabling

Described the control system design (to include code, if applicable)

Demonstrated understanding of tether design and requirements

Developed and described a tether management protocol



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## **Propulsion**

Explained rationale for number, type, and placement of thrusters

Described trade-offs to balance power consumption, cost, performance and mission requirements

## **Buoyancy and Ballast**

Description of buoyancy system that demonstrated application of buoyancy principles

## **Payload and Tools**

Explained rationale for number, type, and placement of cameras

Payload tools were designed to meet mission requirements

Sensors were designed or selected to meet mission requirements

## **Build vs. Buy, New vs. Used**

Explained build (in-house) vs. buy (outsource) decisions and how they related to mission requirements

Explained new vs. reused/inherited decisions and how reused components meet this year's requirements

### **System Integration Diagram (SID)**

**Max Points: 1    Weight: 5%**

## **System Integration Diagrams**

SID was included with the report

**Note:** Pre-competition safety inspectors will review and score in greater detail

### **Safety**

**Max Points: 12    Weight: 10%**

## **Content**

Described the safety rationale, including how it covers personnel, equipment, and operational safety

Highlighted safety features and other vehicle-specific safety precautions related to tasks

## **Safety Procedures**

Document included a checklist for construction and operation

### **Critical Analysis**

**Max Points: 12    Weight: 10%**

## **Testing and Troubleshooting**

Described vehicle testing methodology

Described troubleshooting strategies and techniques used

Described use of prototyping and testing to evaluate design options

### **Accounting**

**Max Points: 24    Weight: 10%**

## **Budget**

Thorough and accurate description of budget planning and following

Reasonable travel expense estimates were provided

## **Cost Accounting**

Overall accounting was thorough and accurate

A clear distinction was made between items purchased, reused, and donated

All income sources were acknowledged and estimates of the fair market value of donations (items, services, and time) were reasonable

Accounting reflected effective use of funds



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## Discretionary Points

*Max Points: 16 Weight: 100%*

- Document described exceptional design of vehicle, sensors, instruments, software, tools or other features

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- Company developed exceptional original software or made exceptional adaptation of software to create a unique solution

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- Document described remarkable effort to design and manufacture every component of the vehicle

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- Other (explanation/example is required in comments)

## Deductions

*Min Points: -12 Weight: 100%*

- Components designed/implemented by a commercial company without adequate justification

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- Evidence that the work was performed by coaches, mentors, parents, or other non-team members

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- Significant overuse of commercial or reused components without adequate justification

## Final Score

*Max Points: 100 + Discretionary & Deductions*

## SCORING RUBRIC - ALL QUESTIONS (Except Discretionary & Deductions)

<b>Missing:</b> Not included, can't evaluate	<b>0</b>
<b>Needs Work:</b> Effort made, meets some key requirements. Understanding or treatment of key requirements needs more depth. Judges had to question deeply to find answers.	<b>1</b>
<b>Partially Meets Requirement:</b> Response demonstrates understanding and addresses most key requirements. Simple prodding from judges encouraged team to answer.	<b>2</b>
<b>Meets Requirement:</b> Response demonstrates thorough understanding and addresses all key requirements. Team addressed topic without prompting.	<b>3</b>
<b>Exceeds Requirement:</b> Response extends beyond key requirements, demonstrating exceptional depth and breadth of understanding	<b>4</b>

## SCORING RUBRIC - DISCRETIONARY POINTS

*Novelty, Depth of Understanding, Depth of Analysis, Effectiveness (functions as intended), Quality of Implementation*

None	<b>0</b>
Minor	<b>1</b>
Fair	<b>2</b>
Good	<b>3</b>
Extraordinary	<b>4</b>

## SCORING RUBRIC - DEDUCTIONS

*Extent to which team relied on outside help, existing work and/or purchased components and services*

None	<b>0</b>
Minor	<b>1</b>
Fair	<b>2</b>
Medium	<b>3</b>
Extreme	<b>4</b>